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The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction☆

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Abstract

Objective: Childhood abuse and other adverse childhood experiences (ACEs) have historically been studied individually, and relatively little is known about the co-occurrence of these events. The purpose of this study is to examine the degree to which ACEs co-occur as well as the nature of their co-occurrence.
Method: We used data from 8,629 adult members of a health plan who completed a survey about 10 ACEs which included: childhood abuse (emotional, physical, and sexual), neglect (emotional and physical), witnessing domestic violence, parental marital discord, and living with substance abusing, mentally ill, or criminal household members. The bivariate relationship between each of these 10 ACEs was assessed, and multivariate linear regression models were used to describe the interrelatedness of ACEs after adjusting for demographic factors.
Results: Two-thirds of participants reported at least one ACE; 81%–98% of respondents who had experienced one ACE reported at least one additional ACE (median: 87%). The presence of one ACE significantly increased the prevalence of having additional ACEs, elevating the adjusted odds by 2 to 17.7 times (median: 2.8). The observed number of respondents with high ACE scores was notably higher than the expected number under the assumption of independence of ACEs ($p < .0001$), confirming the statistical interrelatedness of ACEs.
Conclusions: The study provides strong evidence that ACEs are interrelated rather than occurring independently. Therefore, collecting information about exposure to other ACEs is advisable for studies that focus on the

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consequences of a specific ACE. Assessment of multiple ACEs allows for the potential assessment of a graded relationship between these childhood exposures and health and social outcomes.

Keywords: Child abuse; Child neglect; Household dysfunction; Interrelationship

Introduction

For years, the study of the long-term sequelae of childhood maltreatment has focused primarily on single types of maltreatment, particularly sexual or physical abuse. The recent literature includes an increasing number of studies that assess the impact of more than one type of abuse (Bensley, van Eenwyk, & Simmons, 2000; Briere & Runtz, 1990; Brown, Cohen, Johnson, & Smailes, 2000; De Bellis et al., 2001; Johnson, Cohen, Kasen, & Brook, 2002; Lau, Liu, Cheung, Yu, & Wong, 1999; Liebschutz et al., 2002; Mullen, Martin, Anderson, Romans, & Herbison, 1996; Walsh, MacMillan, & Jamieson, 2002). These studies have shown that the long-term effects of childhood maltreatment are not necessarily the result of any single type of abuse, such as sexual abuse, but may be due to other pathological elements as well, such as psychological abuse, neglect, and family disorganization (Finkelhor, Araji, Baron, Peter, & Wyatt, 1986).

Although the co-occurrence of multiple forms of childhood abuse and household dysfunction is common (Anda et al., 1999; Dong, Anda, Dube, Giles, & Felitti, 2003; Dube, Anda, Felitti, Croft, et al., 2001; Dube, Williamson, Thompson, Felitti, & Anda, 2004; Felitti et al., 1998; Finkelhor, 1998), no summary analysis of the interrelationships among multiple forms of adverse childhood experiences (ACEs) has been reported. A full exploration of the interrelationships is critical to understanding of long-term effects of ACEs. Researchers who study only one or two of these childhood exposures are likely to miss the apparent negative effects of co-occurring traumatic or stressful experiences. Moreover, when such co-occurrence is ignored, researchers and clinicians may hold the implicit assumption that the meaning of the presence of one type of childhood adversity is the same in all cases whether or not others are present (Caron & Rutter, 1991). In fact, conditions such as substance abuse, domestic violence, and criminal activity in the household frequently co-occur with other forms of childhood abuse. Without assessment of the impact of these other factors, long-term influence might wrongly be attributed solely to single types of maltreatment, and the cumulative influence of multiple categories of ACEs would go un-assessed (Anda et al., 1999; Felitti et al., 1998).

Previous studies have shown that ACEs can be viewed as a complex set of highly interrelated experiences that may include childhood abuse or neglect, parental alcohol and drug abuse, domestic violence, parental marital discord, and crime in the home (Anda et al., 1999; Dong, Anda, et al., 2003; Dube, Anda, Felitti, Croft, et al., 2001; Dube, Felitti, Dong, Felitti, Edwards, & Croft, 2002; Dube, Felitti, Dong, Chapman, Giles, & Anda, 2003; Dube et al., 2003; Dube et al., 2004; Felitti et al., 1998). Moreover, strong graded relationships between multiple categories of ACEs and many health-related problems have been reported, such as smoking, adult alcohol problems, drug abuse, unintended pregnancies, male involvement in teen pregnancy, sexually transmitted diseases, liver disease, and suicide attempts, as well as the leading causes of death in the United States (Anda et al., 1999, 2001, 2002; Dietz et al., 1999; Dong, Dube, Giles, Felitti, & Anda, 2003; Dube, Anda, Felitti, Chapman, et al., 2001; Dube, Anda, Felitti, Croft, et al., 2001; Dube et al., 2003; Felitti et al., 1998; Hillis, Anda, Felitti, Nordenberg, & Marchbanks, 2000).

In this study, we analyzed data from the larger ACE Study, a collaboration between Kaiser Permanente in San Diego, California, and the Centers for Disease Control and Prevention (CDC), to provide a detailed description of the interrelationships among 10 categories of ACEs. These categories included childhood abuse (emotional, physical, and sexual), neglect (emotional and physical), and household dysfunction (growing up with domestic violence, parental marital discord, and substance abusing, mentally ill, or criminal household members). In our analyses, we used the ACE score, which is the sum of the number of categories of ACEs, as a summary measure of the total number of these childhood exposures. We first describe the bivariate relationships among the ACEs and then use multivariate linear regression models to describe the interrelatedness of ACEs after adjusting for demographic factors. Finally, we test the null hypothesis that the observed distribution of the ACE score varies from the distribution that would be expected under the assumption that the 10 exposures are independent.

Methods

The data were collected as a portion of the ACE Study, the overall objective of which is to evaluate the association of numerous interrelated ACEs to a wide variety of health behaviors and health conditions. A detailed description of the methods used in the ACE Study has been published elsewhere (Felitti et al., 1998). The study was approved by the institutional review boards of Kaiser Permanente and the Office of Protection from Research Risks at the National Institutes of Health. Potential participants received the ACE Study questionnaire by mail along with a letter, informing them that their participation was voluntary and that their responses would be held in the strictest confidence and would never become part of their medical records.

Study population

The study population included adult members of the Kaiser Health Plan in region of San Diego, California. The subscribers of Kaiser Plan represent a broad range of the general population. Each year more than 50,000 members receive a standardized medical and biopsychosocial examination at Kaiser's Health Appraisal Center in San Diego. The examination is performed primarily as a comprehensive health assessment rather than providing symptom- or illness-based care. In any given 4-year period, 81% of adult members receive such an examination. Between 1995 and 1997, the ACE Study researchers conducted two survey waves among 26,824 adult members who had received an examination at the Health Appraisal Center. The response rate was 70% ($n = 9{,}508$) for Wave I and 65% ($n = 8{,}667$) for Wave II, which yields an overall response rate of 68% ($n = 18{,}175$). Two weeks after the medical history was recorded, the ACE questionnaire was mailed to each member.

As part of the Wave I study design, the standardized health examination data were abstracted for both these who responded and these who did not responded to the ACE Study questionnaire. This procedure allowed a detailed assessment of the study population in terms of possible bias in demographic characteristics and health-related issues (Edwards et al., 2001). Although nonrespondents tended to be younger, less educated, or from racial/ethnic minority groups, the probabilities of both psychosocial and health problems were remarkably similar between respondents and nonrespondents after controlling for demographic differences.

In addition, assessment of the relationships between childhood sexual abuse and numerous health behaviors, diseases, and psychosocial problems showed that their magnitude was virtually identical for respondents and nonrespondents (Edwards et al., 2001). Thus, respondents did not appear to have had a bias toward attributing their health problems to childhood experiences (Edwards et al., 2001).

Questionnaire

The ACE questionnaire contained detailed questions about childhood abuse, neglect, and growing up with household dysfunction as well as information about health-related behaviors from adolescence to adulthood. In the second wave, additional questions were added to the questionnaire to obtain more thorough information about health topics shown to be important during the analysis the data from Wave I (Dietz et al., 1999; Felitti et al., 1998). Only data from Wave II were included in this study, because the Wave II questionnaire included additional items about childhood emotional and physical neglect that were not available in the Wave I survey. After exclusion of three respondents with missing information about race and 35 with missing information about educational attainment, the final study cohort included 8,629 respondents from the Wave II survey.

All questions about ACEs referred to the respondents' first 18 years of life. Questions used to define emotional and physical abuse and growing up with domestic violence were adapted from the Conflict Tactics Scale (CTS; Straus & Gelles, 1990), which has the response categories of "never, once or twice, sometimes, often, or very often." To measure emotional and physical neglect, we used the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 1994), which has response categories of "never true, rarely true, sometimes true, often true, and very often true" and were scored on a Likert scale (1–5), respectively. Some items from the CTQ were reverse-scored to reflect the framing of the question. Questions used to assess the progression in severity of sexual abuse were adapted from Wyatt (1985).

Emotional abuse. Participants were defined as having been emotionally abused during childhood if they responded "often" or "very often" to either of the following two questions: "How often did a parent, stepparent, or adult living in your home swear at you, insult you, or put you down?" and "How often did a parent, stepparent, or adult living in your home act in a way that made you afraid that you might be physically hurt?"

Physical abuse. Two questions were used: "How often did a parent, stepparent, or adult living in your home (1) push, grab, slap, or throw something at you? or (2) hit you so hard that you had marks or were injured?" A respondent was defined as having been physically abused during childhood if the response was either "often" or "very often" to the first question or "sometimes, often, or very often" to the second.

Sexual abuse. Participants were asked the following four questions about whether an adult, relative, family friend, or stranger who was at least 5 years older than themselves ever (1) had touched or fondled their body in a sexual way, (2) had them touch his/her body in a sexual way, (3) attempted to have any type of sexual intercourse with them (oral, anal, or vaginal), or (4) actually had any type of sexual intercourse with them (oral, anal, or vaginal). Subjects were classified as having been sexually abused during childhood if they responded affirmatively to any of these questions.

Emotional neglect. To measure emotional neglect, the following five questions were reverse-scored and summed to determine the CTQ clinical scales: (1) "There was someone in my family who helped me feel

important or special." (2) "I felt loved." (3) "People in my family looked out for each other." (4) "People in my family felt close to each other." (5) "My family was a source of strength and support." Persons with a score of 15 or higher (moderate to extreme) were considered to have experienced emotional neglect in childhood.

Physical neglect. To determine physical neglect, the responses to the following five statements were scored and summed, with questions 2 and 5 reverse-scored: (1) "I didn't have enough to eat." (2) "I knew there was someone there to take care of me and protect me." (3) "My parents were too drunk or too high to take care of me." (4) "I had to wear dirty clothes." (5) "There was someone to take me to the doctor if I needed it." A respondent with a score of 10 or higher (moderate to extreme) was considered to have experienced physical neglect.

Domestic violence. We used four questions from the CTS to consider childhood exposure to domestic violence, all of them preceded by the following statement: "Sometimes physical blows occur between parents. While you were growing up in your first 18 years of life, how often did your father (or stepfather) or mother's boyfriend do any of these things to your mother (or stepmother): (1) push, grab, slap, or throw something at her, (2) kick, bite, hit her with a fist, or hit her with something hard, (3) repeatedly hit her for at least a few minutes, or (4) threaten her with a knife or gun, or use a knife or gun to hurt her?" A positive indication for witnessed domestic violence was a response of "sometimes, often, or very often" to at least one of the first two questions or any response other than "never" to at least one of the last two questions.

Household substance abuse. Two questions were used to determine whether respondents, during their childhood, had lived with a problem drinker, alcoholic (Schoenborn, 1991), or street drug user.

Mental illness in household. A respondent was defined as having been exposed to mental illness if anyone in the household was depressed, mentally ill or had attempted suicide during the respondent's childhood.

Parental separation or divorce. Participants were asked whether their parents had ever separated or divorced during their first 18 years.

Criminal household member. If anyone in the household had gone to prison during the respondent's childhood, the respondent was defined as having been exposed to a criminal household member.

To assess the consistency of the ACE measures, we performed test-retest reliability analysis among 644 persons, who serendipitously visited the Clinic during survey Waves I and II and completed the study questionnaires twice. The results showed kappa coefficients ranged from .56 to .72 for component questions from CTS (emotional and physical abuse, domestic violence), and from .46 to .86 for questions coded dichotomously, which demonstrate moderate to substantial agreement (Dube et al., 2004).

Statistical analysis

We summed the number of categories of ACE to which a person was exposed during childhood. This summary measure, the ACE score, ranges from 0 (unexposed) to 10 (exposed to all categories). This

ACE score reflected two more categories of ACE, emotional and physical neglect, that were added to ACE study for the WAVE II survey only; some prior publications from the ACE Study did not include emotional and physical neglect and therefore had only 8 categories of ACEs.

All statistical analyses were carried out with SAS software (SAS Institute Inc., 1999). Multivariate logistic regression analyses were conducted to investigate whether the presence of each category of ACE was significantly associated with the risk of having other types of ACEs after controlling for demographic covariates to obtain adjusted odds ratios (ORs). To assess whether persons with exposure to one category of ACE have elevated adjusted mean ACE scores (here the ACE score is the sum of the other nine additional ACEs) compared to persons without that exposure, a multiple linear regression was performed. The ACE score was used as the dependent variable and positive and negative responses for the category of ACE were the independent variable. The demographic covariates used in all regression models included age at time of the study, sex, race (other versus White), and education (high school diploma, some college, or college graduate versus less than high school). The SAS GENMOD procedure (generalized linear model) was used to test whether the observed distribution of the ACE score differed from the expected distribution of the ACE score under the assumption that ACEs occur independently of each other.

Persons with incomplete information about an ACE were considered not to have had that experience. This exclusion would most likely result in conservative estimates of the relationships between ACEs, because persons who had potentially been exposed to an experience would always be misclassified as unexposed. This type of misclassification would potentially bias our results toward the null (Rothman, 1986). However, to assess this potential effect, we repeated our analyses after excluding respondents with missing information on any one of the ACEs and found no differences in the final results.

Results

Characteristics of the study population

The study population included 4,674 (54%) women and 3,955 (46%) men. The mean age (±standard deviation) was 55 (±15.5) years for women and 57 (±14.5) years for men. Seventy-three percent of women and 75% of men were White; 32% of women and 42% of men were college graduates; another 42% of women and 39% of men had some college education. Only 8% of women and 7% of men had not graduated from high school.

Table 1 lists the prevalences of the 10 categories of ACEs. Prevalences estimated ranged from 28.2% reporting exposure to substance abuse in the household to 6% reporting growing up with a criminal household member. If a respondent had experienced one category of ACE, 86.5% of these respondents reported having been exposed to at least one additional ACE during childhood, and 38.5% reported four or more additional exposures; these percentages are summarized in Table 1.

Relationships between categories of ACEs

Tables 2 and 3 give the probabilities that persons exposed to any single category of ACEs were also exposed to another category. When persons with one category of ACE were compared to those without that experience, the adjusted odds ratio of having at least one of the other nine forms of ACEs ranged

Table 1
Prevalence of each category of adverse childhood experience and reporting of additional ACEs

ACE category	*N*	Prevalence (%)	Additional ACEs (%)						
			0	≥1	≥2	≥3	≥4	≥5	≥6
Abuse									
Emotional	878	10.2	2	98	90	77	62	42	25
Physical	2,275	26.4	17	83	64	46	32	20	12
Sexual	1,812	21.0	22	78	58	42	29	19	12
Neglect									
Emotional	1,274	14.8	7	93	79	63	47	32	19
Physical	855	9.9	11	89	75	61	50	37	24
Household dysfunction									
Parental separation or divorce	1,125	13.0	18	82	61	43	30	19	12
Household substance abuse	2,435	28.2	19	81	60	41	29	18	11
Household mental illness	1,749	20.3	16	84	65	48	34	21	13
Domestic violence	2,081	24.1	5	95	82	64	48	32	20
Crime	516	6.0	10	90	74	56	43	30	23
Median			13.5	86.5	69.5	52.0	38.5	25.0	16.0
Range			2–22	78–98	58–90	41–77	29–62	18–42	11–25

from 2.0 to 17.7 (median: 2.8) and were statistically significant for all relationships between categories of ACEs ($p < .0001$). For example, the prevalence of reporting physical abuse was 80.5% among persons who reported emotional abuse compared to 20.1% among persons who had not (with adjusted odds ratio of 17.7) (Table 2). Similarly, the prevalence of reporting growing up with substance abuse was 64.5% among persons who reported witnessing domestic violence as a child compared to 22.7% among persons who had not (with adjusted odds ratio of 5.9) (Table 3).

Observed and expected ACE scores

Table 4 shows that two-thirds of participants (67.3%) were exposed to at least one category of ACEs. When we compared the observed distribution of the ACE scores with the expected distribution (under the assumption that all forms of ACEs were statistically independent), we found that the two distributions differed substantially. The observed prevalence of ACE scores of 0 was substantially higher than the expected prevalence, as were the prevalances of ACE scores of 4 or more. For ACE scores of 1, 2, and 3, the observed prevalences were lower than the expected prevalence. The ratios of the observed to the expected probabilities were calculated as a measure of statistical interrelatedness of ACEs among respondents (van den Akker, Buntinx, Metsemakers, Roos, & Knottnerus, 1998). Overall, the ratio of the observed number to the expected number of study participants for each level of ACE score had a U-shaped distribution. Differences between the observed and the expected number for each ACE were statistically evaluated with χ^2 tests, and the hypothesis of independence among the 10 ACEs was strongly rejected ($p < .0001$).

Table 2
Prevalence (%) and adjusted odds ratios for childhood abuse and neglect by presence or absence of an individual ACE

Outcome variables (ACE category)		*N*	Abuse						Neglect			
			Emotional		Physical		Sexual		Emotional		Physical	
			%	OR[a]	%	OR[a]	%	OR[a]	%	OR[a]	%	OR[a]
Abuse												
Emotional	No	7,751	–	–	20.1	1.0[b]	18.6	1.0	9.8	1.0	9.8	1.0
	Yes	878	–	–	80.5	17.7	42.3	3.0	58.9	12.9	58.9	6.3
Physical	No	6,354	2.6	1.0	–	–	16.9	1.0	8.5	1.0	6.3	1.0
	Yes	2,275	31.4	17.7	–	–	32.4	2.4	32.2	5.1	19.8	3.7
Sexual	No	6,817	7.4	1.0	22.5	1.0	–	–	11.8	1.0	8.0	1.0
	Yes	1,812	20.5	3.0	40.7	2.4	–	–	25.9	2.5	16.8	2.5
Neglect												
Emotional	No	7,355	4.9	1.0	20.9	1.0	18.2	1.0	–	–	5.1	1.0
	Yes	1,274	40.6	12.8	57.5	5.1	36.9	2.5	–	–	37.3	12.2
Physical	No	7,774	7.8	1.0	23.4	1.0	19.4	1.0	10.2	1.0	–	–
	Yes	855	31.7	6.3	52.7	3.7	35.7	2.5	56.1	12.2	–	–
Household dysfunction												
Parental separation or divorce	No	6,548	7.3	1.0	22.0	1.0	17.7	1.0	11.0	1.0	7.5	1.0
	Yes	2,081	19.0	2.0	39.9	2.2	31.4	2.0	26.4	2.7	17.6	2.6
Substance abuse	No	6,194	6.7	1.0	21.5	1.0	17.2	1.0	10.8	1.0	7.0	1.0
	Yes	2,435	19.1	2.9	38.7	2.1	30.7	2.0	24.9	2.5	17.3	3.0
Mental illness	No	6,880	6.5	1.0	21.9	1.0	17.8	1.0	11.0	1.0	7.8	1.0
	Yes	1,749	24.7	4.2	43.6	2.8	33.5	2.1	29.5	3.3	18.3	3.4
Domestic violence	No	7,504	7.0	1.0	21.7	1.0	18.7	1.0	11.6	1.0	7.3	1.0
	Yes	1,125	31.3	5.9	57.5	4.7	36.4	2.5	35.9	4.0	27.5	4.6
Crime	No	7,751	9.3	1.0	25.0	1.0	19.9	1.0	13.9	1.0	9.1	1.0
	Yes	878	23.2	2.7	46.4	2.5	38.1	2.4	28.6	2.2	22.6	2.5

[a] In a logistic model adjusting for age at time of survey, race, and educational attainment; $p < .0001$.
[b] The referent group for all results are persons with “No” response.

Discussion

All 10 categories of ACEs were significantly associated with each of the others. If persons had one ACE, the likelihood of their having another was 2 to 18 times higher than those reporting no ACEs. These associations were statistically significant for each category of ACE studied.

In addition, separate assessments of the mean ACE score for a history of exposure to each of the 10 categories of ACEs showed that persons who had any one ACE were likely to have two to four others, whereas those without that ACE were likely to have only one of the others. Two-thirds of participants (67.3%) were exposed to at least one category of ACEs. Moreover, among persons with any single exposure, 86.5% reported at least one additional ACEs and 52% at least three additional ACEs. Thus, exposure to multiple ACEs was very common in our study population.

Table 3
Prevalence (%) and adjusted odds ratio for growing up in dysfunctional household by presence or absence of an individual ACEs

Outcome variables (ACE category)		*N*	Household dysfunction									
			Parental separation/ divorce		Substance abuse		Mental illness		Domestic violence		Crime	
			%	OR[a]	%	OR[a]	%	OR[a]	%	OR[a]	%	OR[a]
Abuse												
Emotional	No	7,751	21.7	1.0 [b]	25.4	1.0	16.9	1.0	10.0	1.0	5.1	1.0
	Yes	878	45.1	2.7	52.1	2.9	49.3	4.2	40.2	5.9	13.7	2.7
Physical	No	6,354	19.6	1.0	23.4	1.0	15.5	1.0	7.5	1.0	4.3	1.0
	Yes	2,275	36.5	2.2	41.4	2.1	33.5	2.8	28.5	4.7	10.5	2.4
Sexual	No	6,817	20.9	1.0	24.7	1.0	17.0	1.0	10.5	1.0	4.7	1.0
	Yes	1,812	36.0	2.0	41.2	2.1	32.3	2.1	22.6	2.5	10.8	2.4
Neglect												
Emotional	No	7,355	20.8	1.0	24.8	1.0	16.7	1.0	9.8	1.0	5.0	1.0
	Yes	1,274	43.2	2.7	47.5	2.5	40.4	3.3	31.7	4.0	11.6	2.2
Physical	No	7,774	22.0	1.0	25.8	1.0	18.3	1.0	10.5	1.0	5.1	1.0
	Yes	855	42.7	2.6	49.2	3.0	37.5	3.3	36.2	4.6	13.7	2.5
Household dysfunction												
Parental separation or divorce	No	6,548	–	–	21.9	1.0	16.0	1.0	8.4	1.0	4.2	1.0
	Yes	2,081	–	–	48.0	3.0	33.6	2.5	27.7	3.9	11.4	2.6
Substance abuse	No	6,194	17.4	1.0	–	–	14.8	1.0	6.4	1.0	3.7	1.0
	Yes	2,435	41.0	2.9	–	–	34.1	2.7	29.8	5.9	11.9	3.3
Mental illness	No	6,880	20.0	1.0	23.2	1.0	–	–	10.3	1.0	4.3	1.0
	Yes	1,749	40.0	2.5	47.6	2.7	–	–	24.0	2.8	12.5	3.3
Domestic violence	No	7,504	20.0	1.0	22.7	1.0	17.7	1.0	–	–	4.6	1.0
	Yes	1,125	51.2	3.9	64.5	5.9	37.2	2.8	–	–	15.2	3.2
Crime	No	7,751	22.7	1.0	26.4	1.0	18.8	1.0	11.7	1.0	–	–
	Yes	878	46.0	2.6	56.1	3.3	42.4	3.3	33.3	3.2	–	–

[a] In a logistic model adjusting for age at time of survey, race, and educational attainment; $p < .0001$.
[b] The referent group for all results are persons with "No" response.

Our findings provide a statistical basis for use of the ACE score by assessing the ratio of the observed to expected prevalences for each level of the ACE score. The finding of the U-shaped distribution for this ratio indicates that persons with no ACEs and persons with higher numbers of ACEs were observed much more frequently than would have been expected under the assumption that ACEs are independent (van den Akker et al., 1998). This finding, along with the finding that among the 10 ACEs studied none occurs independently of the others, clearly indicates that these experiences should not be assumed to be isolated events in children's lives.

The common co-occurrence of ACEs is important clinically because the negative short- and long-term influence of ACEs on behaviors, emotional and social well-being, and physical health has repeatedly been shown to be cumulative (Anda et al., 1999; Dietz et al., 1999; Dong, Dube, et al., 2003; Dube, Anda,

Table 4
Observed and expected numbers of observations by ACE score

ACE score	Observed		Expected		Observed/expected
	N	%	*N*	%	
0	2,837	32.7	1,195	13.7	2.4
1	2,221	25.6	2,719	31.3	.8
2	1,343	15.5	2,689	31.0	.5
3	851	9.8	1,465	17.0	.6
4	510	5.9	478	5.5	1.1
5	386	4.5	106	1.2	3.6
≥6	519	6.0	17	.2	29.8

Felitti, Chapman, et al., 2001; Dube et al., 2004; Felitti et al., 1998; Hillis et al., 2000). Therefore, researchers trying to understand the long-term health implications of childhood abuse may benefit from considering a wide range of ACEs. Certain adult health outcomes may also be strongly related to unique combinations or to the severity of adverse childhood experiences (Briere & Runtz, 1988; MacMillan et al., 2001). More generally, the analysis we have presented illustrates the need for approaches that provide an overview of the net effects of a group of complex childhood exposures on a wide range of health risk behaviors, social problems, and diseases.

Caron and Rutter (1991) provided several possible explanations of true comorbidity of child and adult psychiatric conditions: shared and overlapping risk factors, the comorbid patterns constituting a distinct meaningful syndrome, and one disorder creating an elevated risk for others. Certainly in our study most of the ten categories of ACEs share the same risk factors. For instance, children exposed to an extreme parental marital conflict are more likely to be neglected and to witness domestic violence (Wolf, McMahon, & Peter, 1997). Study of abusive families provides a critical base for understanding the causes and consequences of physical abuse (Sedlak, 1997). Also, the unique impact that an adversity, such as physical abuse, has on a child's development may be difficult to separate from other family and environmental forces, such as parental marital violence and separation of family members (Wolf et al., 1997). To understand the etiology of child maltreatment, it is important to keep in mind that there is no single cause of childhood trauma; rather, multiple and interacting factors at the individual (parent and child), familial, community, and societal levels contribute to child maltreatment (Belsky, 1980).

There are several potential limitations in retrospective reporting of childhood experiences. Some researchers have suggested that present emotional impairment may influence the memory for events and that emotional disorders are more common among adults who experienced abuse or other adverse experiences during childhood. However, there is little evidence to support the claim that recall of experiences in childhood is altered by psychiatric symptoms or disorders (Brewin, Andrews, & Gotlib, 1993). Nonetheless, some people may have difficulty recalling certain events as a protective mechanism. Longitudinal follow-up study of adults whose childhood abuse was documented has shown that their retrospective reports of childhood abuse are likely to underestimate actual occurrence (Della Femina, Yeager, & Lewis, 1990; Williams, 1995).

In our study, difficulty recalling childhood events most likely would result in the classification of persons with exposure to ACEs as unexposed. If both the single exposure and the outcome (in this case the outcomes are other ACEs) are underreported, the results become biased toward the null (Rothman, 1986).

Thus, the relationships between the ACEs that we reported probably underestimate the true magnitude of their interrelatedness.

Our estimates of the prevalence of childhood exposures are similar to estimates from nationally representative surveys (Finkelhor & Dziuba-Leatherman, 1994; Wyatt, Loeb, Solis, Carmona, & Romero, 1999), indicating that the experiences of our participants are comparable to those of the larger population of adults. For example, in our study we found that 16% of the men and 25% of the women met the case definition for contact sexual abuse; a national telephone survey of adults conducted by Finkelhor, Hotaling, Lewis, and Smith (1990) using similar criteria for sexual abuse estimated that 16% of men and 27% of women had been sexually abused. Of the men in our study, 28% had been physically abused as boys, which closely parallels the percentage (31%) found in a recent population-based study of men in Ontario that used questions from the same scales (MacMillan et al., 1997). The similarity in estimates of the prevalence of these childhood exposures between the ACE Study and other population-based studies suggests that our findings are likely to be applicable in other settings.

In summary, adults who reported any single form of adverse childhood experience were likely to have suffered multiple other adverse experiences during childhood. Therefore, control for exposure to other ACEs is advisable for researchers trying to study the independent consequence of exposure to a specific ACE or those who wish to assess the cumulative impact of multiple childhood exposure. Such co-occurrence is important to consider when identifying and treating children who have been exposed to any abuse. Likewise, children who have been identified as having been exposed to abuse, neglect, or household dysfunction should also be screened for other types of maltreatment. This information should be incorporated into the design of future studies, which may provide support for better psychological and medical diagnoses and treatment of affected persons and lead more readily to the integration of prevention programs, social services, and legal venues.

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Résumé

Objectif: De tradition, on a étudié les mauvais traitements et d'autres expériences nocives de l'enfance séparément, donc peu est connu des situations où les deux se produisent ensemble. Le but de cette étude fut d'examiner dans quelle mesure plusieurs expériences néfastes se produisent et quelle est la nature des liens qui les caractérisent.

Méthode: Notre étude s'est servie de données sur 8.629 adultes membres d'un plan de santé, lesquels ont répondu à une enquête concernant dix expériences affligeantes (comprenant la maltraitance physique, sexuelle et émotionnelle, la négligence physique et émotionnelle, le fait d'avoir été témoin de violence entre conjoints ou dans la famille, le fait d'être exposé à la discorde entre conjoints ou les problèmes de drogue ou d'alcool, la maladie mentale ou les activités criminelles de la part des membres de la famille). On a étudié la relation bi-variable entre chacune de ces expériences, puis on a eu recours à un modèle de régression linéaire à plusieurs variables pour expliquer les liens entre ces expériences, ayant d'abord pris en considération les facteurs démographiques.

Résultats: Les deux tiers des participants rapportent avoir vécu au moins une expérience nocive; entre 81% et 98% des participants de ce groupe ont aussi connu au moins une autre expérience malheureuse (médiane: 87%). D'avoir vécu une telle expérience prédispose clairement vers une ou plusieurs autres

expériences, au point ou la probabilité s’élève de 2 à 17.7 fois (médiane: 2.8). Le nombre de participants ayant un score élevé est beaucoup plus considérable si l’on se fie à la probabilité ($<.0001$) que l’expérience serait un phénomène isolé, ce qui confirme qu’il existe véritablement une relation statistique entre ces expériences de vie.

Conclusions: L’étude apporte des preuves importantes à savoir que les expériences nocives en enfance sont reliées plutôt que d’être isolées les unes des autres. Donc, les études portant sur les conséquences d’une expérience nocive particulière devraient recueillir des données sur l’ensemble des expériences nocives que l’enfant a connues. Évaluer l’ensemble de ces expériences permettra de mieux dégager une gradation dans les relations entre ces diverses expériences d’une part, et les caractéristiques sanitaires et sociales.

Resumen

Objetivo: El maltrato infantil y otras experiencias adversas de la infancia (EAIs) han sido estudiadas habitualmente de manera individual y se conoce relativamente poco sobre la co-ocurrencia de estos acontecimientos. El objetivo de este estudio es examinar el grado en que estas experiencias ocurren de manera simultánea y la naturaleza de dicha co-ocurrencia.

Método: Se utilizaron datos de 8629 miembros adultos de un plan de salud que completaron una encuesta sobre 10 experiencias adversas infantiles que incluían: maltrato infantil (emocional, físico y sexual), negligencia (emocional y física), ser testigo de violencia doméstica, mala relación de pareja de los padres, haber vivido con una persona que abusa de drogas, con un enfermo mental o con delincuentes. Se evaluaron las relaciones bivariadas entre cada una de estas 10 experiencias adversas infantiles y se utilizaron modelos de regresión linear multivariada para describir las interrelaciones entre las experiencias adversas infantiles después de controlar los factores demográficos.

Resultados: Dos tercios de los participantes notificaron al menos una experiencia adversa infantil (EAI). Entre un 81% y un 98% de quienes experimentaron una EAI notificaron al menos una EAI adicional (mediana: 87%). La presencia de una EAI aumentó significativamente la prevalencia de haber tenido EAIs adicionales elevando las Odds ajustadas entre 2 y 17 veces (mediana: 2.8). El número observado de sujetos con altas puntuaciones en EAI era notablemente más alto que el número esperado bajo la asunción de independencia de EAIs. ($p < .0001$) confirmando la interrelación estadística de las EAIs.

Conclusiones: El estudio proporciona fuerte evidencia de que las EAIs están interrelacionadas y de que no ocurren de manera independiente. Además, se considera que recoger información sobre la exposición a otras EAIs es aconsejable para los estudios que se centran en las consecuencias de una EAI específica. La evaluación de múltiples EAIs conduce a la evaluación potencial de una mayor relación entre estas experiencias infantiles y consecuencias sociales y sanitarias.